

## THE GERMAN NAVAL OBSERVATORY

*Aus dem Archiv der Deutschen Seewarte.* VI. Jahrgang, 1883. Herausgegeben von der Direktion der Seewarte. (Hamburg, 1885.)

THIS, the sixth yearly report of the German Naval Observatory at Hamburg, of which Dr. Neumayer is the Director, contains much valuable information as to the increasing and successful application of scientific methods and results to the safe navigation of the German Imperial and Mercantile Navies, in addition to the usual details as to the *personnel* and working of the whole establishment.

The volume contains four papers, but the first is that in which the most general interest is likely to be taken, the other three referring to special reports on subjects connected with one or other of the four departments into which the work of the Observatory is divided.

Commencing therefore with the first paper, there will be found a general report showing much activity in the collating and distribution of information on the important subjects of meteorology, magnetism, and geography, and describing the arrangements for making the observations in the head Observatory at Hamburg, and the affiliated stations on the coast. It may also be noticed that one of the principal additions to the Observatory in 1883 was an instrument for the systematic observation of refraction, but the description is deferred to another report.

Following the general report is an account of the work accomplished in each of the four departments before mentioned.

Department I. is devoted principally to maritime meteorology, and it will be found that the system adopted follows closely on the lines of our own Meteorological Office in the collection of observations on the coast and at sea, and publication of results.

In Department II. the work resembles in some particulars that which is now making Kew Observatory such a valuable aid to the nautical world in the testing of sextants, barometers, and thermometers. At the Hamburg Observatory, however, they also prove compasses, compensating magnets, log-glasses, and position lanterns for ships' use.

It may be remarked in passing that the production of a novel form of compass by Sir William Thomson in 1876, and the full explanation by him of the principles involved in its construction in several lectures, accompanied by the subsequent success of that instrument in its later form, has had a world-wide influence in modifying the previously conceived ideas of the best form of compass for navigational purposes. For example, at p. 32 of the first paper there will be found the announcement of a new compass constructed in 1882 under the supervision of the Director of the Observatory in which all the principles of the Thomson compass have been carefully retained, but with certain changes securing greater strength in the compass card. These changes were introduced in view of the consideration that the Thomson card was too fragile to stand the rough handling it might be subjected to on board ship. This new compass has been patented in Germany, and after considerable trial in their mercantile marine has proved successful.

But this department has also turned its attention to the instruction of officers in the magnetism of iron ships by

approved teachers of navigation, and at pp. 32 and 33 information is given as to the number of ships swung for deviation of the compass by the officials of the Observatory, and their compass arrangements scientifically treated, also of the large number of ships' compass journals sent to the Observatory for discussion. When the journals have been examined, instructions for the future guidance of the captains of the several ships are given as to the probable deviations of their compasses in the ensuing voyage.

As a useful aid to this scientific examination of ship's compasses, the terrestrial magnetic elements with the annual change are given for certain ports on the German coast.

In Department III. the important work relating to weather forecasts, coast meteorology, and storm warnings is carried on, and tables are given showing the number of days on which forecasts were given for inland and the coast, and of the degree of accuracy attained.

In 1883 the first attempt in establishing a limited night service for issuing storm warnings at night was commenced, a lantern showing a red light being hoisted as the signal.

Department IV. conducts all matters relating to the trial of chronometers, and an account is given of the trial of several descriptions of those valuable instruments, as well as of an apparatus for simulating the action of a ship in a seaway upon them, the effect of temperature being observed at the same time.

Six chronometers of the German Navy have been tried in this apparatus, but the results are not reported. It may be a matter of curiosity to hear how far this apparatus has been a success, but long and varied experience in England has shown that if the rate of a chronometer due to the elements of time and temperature are properly ascertained and furnished to the seaman, he will soon find out the effects of the ever-varying motion of his ship at sea with a precision which an apparatus on shore is not likely to attain in advance.

At p. 43 some useful information is given respecting the scientific work carried on independently by the several departments of the Observatory.

Paper No. 2.—This has been written as a guide for popular instruction in the nature of the deviations of the compass in iron ships by means of a model. A woodcut of the model is given, and the results of some twenty-seven experiments recorded. Models of a similar kind are in use in England and America, and are found very useful in imparting practical information concerning the causes and correction of the deviations of ships' compasses.

In Paper No. 3 there is a discussion of a series of observations of the magnetic declination in Barth, made during the years 1881-2-3-4, a period of time which should render them interesting to magneticians.

The fourth and last paper consists of a special report on the trials of marine chronometers sent in by different makers, and of varied construction, during the three years 1880-83. The results of these trials are here mathematically discussed, and chiefly by the use of M. Villarceau's formula for rate, in which the rate  $g$  of a chronometer is considered to be a function of the two independent variables— $t$ , the time, and  $\theta$ , the temperature. The tables of rates recorded resemble very closely those published by the Greenwich Observatory, with the

exceptions that, instead of weekly sums of the rates being given, the sums are given for every ten days, and the Centigrade thermometer is used. The chronometers are also kept in a constant temperature for each ten days of the period of trial commencing with 15° C., then with the temperature raised 5° for each decade until the maximum, 30°, is reached. The trials are continued in the same manner with decreasing temperatures until 5° is reached, and lastly with temperatures increasing to 30° as before.

From what has been said it will be seen that at the Naval Observatory in Hamburg a wide range of subjects is taken under its supervision, and it may be added that the volume now under review is a full and able exponent of its work and aims.

#### VARIATION IN DOMESTICATED ANIMALS

*Fancy Pigeons.* By J. G. Lyell.

*Poultry for Prizes and Profit.* By J. Long.

*Book of the Goat.* By H. Holmes Pegler.

*British Cage-Birds.* By R. L. Wallace. (London: L. Upcott Gill, 1885.)

WE have grouped the above-named works together inasmuch as they all treat of the varieties existing in domesticated animals, and are moreover serials in course of publication by the same publisher.

Previous to the issue of Darwin's great work on "Variation in Plants and Animals," the subject was treated with undisguised contempt by biologists generally, and thought to be worthy of consideration only by florists and fanciers, not even its importance in reference to the food supply of man being properly estimated. The origin of this opinion was no doubt correctly given by the late Dr. Gray, when, in reply to the question put to him by the writer of this notice, "Why naturalists ignored the existence of varieties, a variation, however abnormal or monstrous it might appear, being as real as the most normal species," he answered, "The reason, my dear sir, is that they know nothing at all about them."

Nor is this ignorance extinct at the present day. In the Museum of the College of Surgeons may be seen the skull of a crested fowl, with the peculiar bony growth supporting the crest, and the accompanying hour-glass-shaped cavity of the cranium, which are characteristic of the entire race, described as the result of disease in the catalogue compiled by Sir Richard Owen. Nor need we go further than our own unrivalled zoological vivarium to see specimens which every breeder of domestic animals believes to be mere varieties, such as woolly cheetahs and black-shouldered peacocks, exhibited as "good species."

How many naturalists even now care to ascertain what are the limits of variation in any given species, or to what extent the characteristics of allied animals or groups of animals may be reproduced by what Darwin termed "analogous variation."

By careful selection, aided by great practical experience, the skilled breeder can produce almost any pattern of plumage or any disposition of colour he pleases, limited only by the range of colours and markings natural to other animals of the family to which the species belongs on which he is experimenting. Thus all the markings of the wild Felidæ can be reproduced in the domestic cat; those

of the Columbidae in the pigeon; but the feline markings cannot be produced in the dog, nor the distribution of colour seen in the Australian pigeons be implanted in the domestic fowl.

It unfortunately happens that the peculiar bent of mind which makes a man a "good fancier" does not necessarily tend to constitute a good naturalist, and it is rare for the two pursuits to be combined in the same person; the zoologist despising the fancier and his monstrosities, which are the result of artificial selection, and the fancier, on the other hand, if he has even a slight acquaintance with zoology, laughing at the naturalist who manufactures what he calls "good species" out of a slight variation of plumage, which he, the fancier, would breed to order without the slightest difficulty. For examples of this proceeding, we need only turn to recently manufactured species of the genus *Phasianus*.

To those ornithologists who would wish to note the almost infinite variety of pattern, colouration, and marking to which the descendants of *Columba livia* can be bred, we would recommend the "Fancy Pigeons" of Mr. Lyell; it contains a more detailed and fuller account of the numerous breeds than any book in the language, although some of the theories of the writer will not meet with the support of ornithologists. The work, moreover, has a sufficient number of engravings, both coloured and plain, to render the descriptions easy to follow; and these are not, as is too often the case in works written by a fancier for fanciers, grossly exaggerated.

"Poultry for Prizes and Profit" treats, as far as it has proceeded, of the characteristics of the various breeds of fowls, of which, as of pigeons, new varieties are being constantly produced. Of the manner in which fanciers confound species and varieties a strong example is given, the author describing the very distinct and strongly characterised species, *Gallus furcatus*, as a variety of the domestic fowl.

The "Book of the Goat" contains a very good description of the various breeds of goats found in different parts of the world, and most valuable and practical directions for the management of the animal in a domestic state as a useful milk-producer.

"British Cage-Birds," the last of the serials on our list, deals more with wild species than with varieties. It gives the mode of capture, treatment in captivity, &c., of British birds that are kept in confinement for the sake of their song or beauty of plumage. This work is also largely illustrated, but the engravings in many instances are capable of improvement.

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#### OUR BOOK SHELF

*Differential and Integral Calculus, with Applications.* By A. G. Greenhill, M.A. Pp. xi. and 272. (London: Macmillan and Co., 1886.)

WITHIN the limits of 267 pages it is not easy to make improvement in so vast a subject as that of this treatise. The chief novelty is the concurrent treatment of differential and integral calculus. A great step in perspicuity has been made by the use of the *complete* notation of hyperbolic trigonometry ( $\sinh$ ,  $\cosh$ , &c., and  $\sinh^{-1}$ ,  $\cosh^{-1}$ , &c.), which shows the perfect analogy of the